Soil Management Plan
Operable Unit 4
Swan Island Upland Facility
Portland, Oregon

Prepared for:
Port of Portland

April 23, 2012
1115-11

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

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1.0 Introduction

This Soil Management Plan (SMP) has been prepared for use at Operable Unit 4 (OU4) at the Swan Island Upland Facility (SIUF) in Portland, Oregon. Figures 1 and 2 show the location of OU4. The risk assessment, feasibility study (FS), and source control evaluation (SCE) report (Ash Creek, 2010) completed for the Facility identified two areas of soil with concentrations of chemicals above occupational site use screening levels. One area also exceeded construction worker screening levels. In the FS, the recommended remedial action to address baseline risk to occupational workers is capping of these two areas. This SMP was prepared as a complement to the cap to address baseline risk to construction workers and to assist in decision-making and appropriate soil management during operations at the Facility.

1.1 Purpose and Use

The purpose of this SMP is to summarize procedures for cap inspection, cap maintenance, and appropriate management of soil at the Facility that may contain chemicals of concern (COCs) at concentrations above human health based screening levels for occupational and/or construction worker site use. The two areas at which COCs may be encountered above the relevant screening levels are shown on Figure 3 and are referred to herein as the Soil Management Areas. Table 1 provides a description of each Soil Management Area.

The SMP provides:

- Identification of Soil Management Areas requiring appropriate handling of soil (see Figure 3 and Table 1);
- Recommended cap inspection scope, inspection schedule, and maintenance;
- Information needed to properly handle the soil within the identified Soil Management Areas during future site activities (including redevelopment); and
- Information needed to make informed decisions regarding health and safety of site workers.

This SMP is intended to provide instruction regarding certain activity restrictions and soil handling requirements in identified Soil Management Areas at the Facility. Section 2 provides a brief summary of the background of the Facility and the current environmental conditions. Section 3 discusses the specific soil management components for the Facility.

1.2 Limitations

The scope of this SMP is intended to address the identification and proper handling of soil defined by the Facility risk assessment that does or may contain COCs above human health based screening levels. The SMP is not intended to provide health and safety recommendations for the protection of site workers or

construction personnel. Persons involved in construction activities or site operations that could result in exposure to site soil should be familiar with the content of this SMP, but should have a Health and Safety Plan (HSP) prepared specific to their work.

1.3 Regulatory Framework

The following describes the regulatory framework for remedial action at the Facility.

- The Port entered into a Voluntary Cleanup Program Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study (Voluntary Agreement) of the Facility with the Oregon Department of Environmental Quality (DEQ) on July 24, 2006.
- The SIUF Upland Facility is divided into four operable units. Until 2008, OU4 was part of OU2, but was designated a separate OU to facilitate the sale of the property from the Port to Shipyard Commerce Center LLC.
- As part of the OU4 sale agreement, the Port is obligated to obtain a determination of no further action from the DEQ. At that time, responsibility for future activities, including implementation of this SMP, transfers to the property owner, Shipyard Commerce Center LLC.
- A risk assessment, FS, and SCE were completed by the Port and a report of the results submitted to the DEQ in April 2012 (Ash Creek, 2012).

2.0 Background

2.1 Facility Location and Description

Figure 2 shows the layout of OU4. The property covers approximately 7.8 acres on the south side of Swan Island, south of N. Channel Avenue. The bulk of the property consists of a paved parking lot with landscaped islands. None of OU4 is adjacent to the bank of the Willamette River. OU4 is relatively flat with land surface elevations generally ranging between 30 and 34 feet (NGVD 29 with the 1947 adjustment).

2.2 Geology and Hydrogeology

Geology. Investigations performed at the SIUF (Ash Creek, 2007; Bridgewater Group, 2000, 2001, 2002, 2008) characterized geologic conditions to approximately 40 feet below the ground surface (bgs). The soils beneath the SIUF are mixtures of silt, sandy silt, silty sand, sand, and sand with gravel. In general, sand and occasional gravel are encountered to a depth of approximately 20 feet bgs. These materials represent Willamette River dredged materials that were placed on Swan Island when it was reconfigured and raised in elevation in the 1920s. Underlying the fill is recent alluvium associated with the original Swan Island, consisting of variable mixtures of silt, sandy silt, silty sand, and sand.

Hydrogeology. Shallow groundwater occurs under water table conditions at the SIUF. The depth to groundwater ranges from approximately 18 to 30 feet bgs. Shallow groundwater is recharged by the infiltration of precipitation that falls on Swan Island. Shallow groundwater beneath OU4 discharges to the Willamette River.

Groundwater elevation near the shoreline of the Willamette River fluctuates in response to diurnal tidal cycles and seasonal changes in Willamette River elevations. Groundwater monitoring performed for the SIUF remedial investigation found that groundwater elevations in wells installed near the shoreline fluctuated approximately 8 feet. Inland, toward the middle of Swan Island, the response to changes in river elevations is less pronounced, with observed fluctuations of less than 1 foot.

2.3 Environmental Conditions

The risk assessment/FS/SCE report (Ash Creek, 2010) completed for the Facility identified two areas with COCs present above human health based risk screening levels. Figure 3 shows the locations of these two areas. The data collected at the Facility is compiled in Appendix A. Sample locations are shown on Figure A-1 in Appendix A. Soil Management Area 1 covers an area of approximately 110,000 square feet. It contains benzo(a)pyrene above occupational and, in a more limited area, construction worker risk-based concentrations (RBCs). The depth of soil containing benzo(a)pyrene above RBCs varies from primarily surface soil (0.8 to 3 feet bgs) to as much as approximately 20 feet bgs. Soil Management Area 2 is represented by a single near surface soil sample containing arsenic above the occupational RBC. The estimated area is up to 5,000 square feet, and the depth range is 0.8 to 3 feet bgs.

2.4 Existing Cap

OU4, including the Soil Management Areas, are covered with an active asphalt concrete paved parking lot. The cap section is typically 4 inches of asphalt concrete overlying 5 inches of crushed rock base, but the section varies from 3 inches on 9 inches to 5 inches on 11 inches (asphalt concrete overlying crushed rock base).

3.0 Contaminated Soil Management

The SMP was prepared to support management of soil in the Soil Management Areas identified on Figure 3. This will consist of the following elements:

- Cap Inspection and Maintenance;
- Management of soil, when soil within the Soil Management Area is accessed; and
- Additional health and safety considerations.

3.1 Cap Inspection and Maintenance

The purpose of the cap is to prevent occupational worker direct contact with benzo(a)pyrene and arsenic in the shallow soil. The extent of the capped area is shown on Figure 3. As the effectiveness of the pavement cap relies on the integrity of the pavement, the property owner shall be responsible for regular annual inspections of the paved surface to identify cracking, spalling, or other failures that would potentially allow contact with the underlying soil. If such failures are identified, the pavement will be repaired as soon as can be practicably done. Repairs would consist of seal coat, overlayment, and/or replacement of pavement and base rock. Inspections will be conducted annually. Documentation of the inspections and any associated follow-up activities will be made using the forms included in Appendix B (or other comparable documentation) and maintained with the SMP in company files.

3.2 Soil Management

This section discusses soil management requirements related to potential COCs in the Facility soil. Information related to upgraded health and safety considerations are discussed in Section 3.3. The upgraded health and safety requirements are in addition to requirements that may be imposed on construction projects under federal, state, or local regulations.

Applicability. The requirements of this plan shall apply to soil within the Soil Management Areas shown on Figure 3. These areas correspond to soil containing COCs above applicable or relevant screening criteria. Soil within these areas shall be assumed to contain COCs unless sampling in accordance with generally accepted environmental practices and in accordance with Section 3.2.1 demonstrates that the soil is suitable for unrestricted use.

Scope. Soil management shall consist of the following steps:

1) Characterize the soil to be disturbed in accordance with Section 3.2.1.
    a) If COCs are equal to or less than the unrestricted use criteria (see Table 2), then no special handling is required and skip to Step 4.
    b) If COCs are present above the unrestricted use criteria, proceed to Step 2.
2) Handle soil in accordance with the requirements in Section 3.2.2.
3) For final disposition of excavated soil, follow the requirements of Section 3.2.3.
4) Prepare and file a report in accordance with Section 3.2.4.

3.2.1 Characterization of Soil

Soil to be disturbed by activities within the Soil Management Areas shown on Figure 3 shall be characterized for proper handling and disposition. In accordance with the SMP, characterization may be conducted either prior to or after the soil disturbing activity.

Characterization Prior to Construction. Soil samples shall be collected at a frequency and using procedures in accordance with generally accepted environmental practices at the time of the work to obtain representative samples of the disturbed soil. At a minimum, soil samples shall be analyzed as follows:

- Area 1: Polycyclic aromatic hydrocarbons (EPA Method 8270-SIM) and total petroleum hydrocarbons (method NWTPH-Dx);
- Area 2: Arsenic (EPA Method 6010 or 6020).

If soil is to be removed from the site and disposed of at a regulated facility, the potential disposal facility should be contacted for any other testing that may be required for acceptance for disposal.

Once characterization results are obtained, the results should be compared to the criteria listed in Table 2. If the soil contains one or more COCs at concentrations above the unrestricted use criteria, Sections 3.2.2 and 3.2.3 apply. If no COCs exceed the unrestricted use criteria, this plan places no additional restrictions on the soil handling or disposition than would ordinarily apply from applicable state and federal regulations.

Characterization after Excavation. If soil is characterized after excavation, the soil shall be presumed to contain COCs until testing demonstrates otherwise. The soil shall be handled in accordance with Section 3.2.2. Stockpiles shall be sampled at a frequency and using procedures in accordance with generally accepted environmental practices at the time of the work. At a minimum, soil samples shall be analyzed as defined above. The potential disposal facility should be contacted for any other testing that may be required for acceptance for disposal.

3.2.2 Handling of Soil with COCs above Unrestricted Use Criteria

Until demonstrated otherwise (such as by the characterization described in Section 3.2.1), soil from the Soil Management Areas shown on Figure 3 shall be presumed to contain COCs above the unrestricted soil use concentrations shown in Table 2 and shall be handled in accordance with the procedures in this section. The procedures in this section are in addition to any other requirements for handling soil without COCs.

Soil Excavation. Excavated soil that contains COCs above unrestricted use concentrations (see Table 2) shall be maintained within the limits of the excavation, stockpiled in accordance with this plan, or placed immediately into a waiting truck. During excavation, the soil should be observed for evidence of contamination (e.g., stained soil, petroleum-like sheen). If observed, the soil with visible indications of

contamination should be stockpiled separately from other soil and thus further characterized and managed appropriately. Soil from Area 1 should not be mixed with soil from Area 2.

Stockpiling. Excavated soil that is not direct loaded to trucks for removal from the Facility shall be placed in a covered roll-off box or in a stockpile. Stockpiles shall be maintained at all times in a manner that prevents runon, runoff, and erosion of the stockpiles. Stockpiles shall be placed on plastic sheeting (6-mil minimum) with a berm around the perimeter of the stockpile. The berm may be constructed by laying the bottom plastic over straw bales, Jersey Barriers, ecology blocks, or by other equivalent methods. When not active, stockpiles shall be covered with plastic and secured with sand bags or equivalent. The soil shall remain in well-maintained stockpiles until final disposition. Once sampled, no soil shall be added to a stockpile.

Loading and Hauling. Excavated soil may be loaded into trucks for hauling to a disposal facility or a temporary stockpile. During loading, care shall be taken to minimize spillage of soil on the exterior of the trucks or clean ground surface. Any soil on the truck exterior shall be removed prior to leaving the loading area. The trucks shall be covered with a tarp prior to departing the Facility. Trucks shall not be allowed to leave the Facility if liquids are draining from the load. Excavated soil shall be transported in accordance with appropriate Department of Transportation regulations.

3.2.3 Final Disposition of Soil

The results of the characterization testing (Section 3.2.1) shall be used to determine the final disposition of excavated soil, as follows:

- If COC concentrations are less than unrestricted use criteria (Table 2), then this plan places no restrictions on the use of the soil.
- If COC concentrations are less than Occupational Screening Levels (Table 2), but at least one COC exceeds the unrestricted use criteria, then the soil may be re-used at the Facility within the Soil Management Area from where it originated provided that this use does not result in storm water concentrations that exceed applicable standards (e.g., it can not be placed in erosional areas near unprotected storm water inlets).
- If at least one COC concentration exceeds Occupational Screening Levels, then the soil shall be properly designated and disposed of at a licensed disposal facility or placed beneath an appropriately engineered cap on the Facility.

3.2.4 Reporting

A brief letter report shall be prepared presenting the results of sampling, chemical analysis, and soil disposition. At a minimum, the letter report will include:

- A site plan showing soil sample locations;
- Summary tables of analytical results;
- Discussion of field observations and results;
- Documentation of quantities and final disposition of soil, including a site plan if soil is left at the Facility;
- Copies of soil disposal receipts, if applicable; and
- Analytical laboratory reports.

Each report should reference the DEQ Environmental Cleanup Site Information (ECSI) number for the Facility: ECSI No. 271. The report shall be maintained with this SMP as an addendum.

3.3 Health and Safety Training and Planning

This section addresses health and safety training in addition to that which is normally conducted for construction activities. Any party completing any activity within the Soil Management Areas at the Facility as defined on Figure 3 must comply with the following requirements.

Training. Employees engaged in activities that include exposure to media containing COCs above applicable risk-based health levels must be trained in accordance with 29 CFR 1910.120. Training will not be required for work areas that have been characterized (prior to the work activities) and shown not to contain COCs at concentrations above the unrestricted use criteria, or where a risk analysis demonstrates that the COCs will not pose an unacceptable risk to the site workers.

Health and Safety Plan. The party in charge of the site activity shall prepare and implement an HSP in accordance with Occupational Safety and Health Administration [OSHA] requirements (i.e., 29 CFR 1910.120) and Oregon Administrative Rules. The HSP shall be prepared by a Certified Industrial Hygienist or qualified safety professional with a minimum of 40 hours of OSHA HAZWOPER training. The HSP shall identify and address, but not be limited to, the physical and chemical hazards of the site and the proposed activities. The HSP content shall, at a minimum, describe the following:

- Required personal protective equipment;
- Site safety supervisor;
- Action levels at which protection would be upgraded;
- Controls to be used to minimize worker exposure to hazardous substances;
- Exclusion, contamination reduction, and clean zones;
- Personnel decontamination procedures;

- Route to hospital; and
- Monitoring equipment to be employed.

Data tables from soil investigations within or near the Soil Management Areas at the Facility are reproduced in Appendix A, and these data provide a guideline for the magnitudes of COCs encountered in the Soil Management Areas at the Facility.

4.0 References

Ash Creek, 2007. Former Substation and Berth 305 Sampling Results Addendum, Swan Island Upland Facility, Portland, Oregon, ECSI No. 271. November 14, 2007.

Ash Creek, 2012. Risk Assessment, Feasibility Study, and Source Control Evaluation, Operable Unit 4, Swan Island Upland Facility, Portland, Oregon. April 23, 2012.

Bridgewater Group, 2000. Remedial Investigation/Feasibility Study Work Plan for the Portland Shipyard, Portland, Oregon. November 2000.

Bridgewater Group, 2001. Phase IB Work Plan Addendum, Portland Shipyard Remedial Investigation. July 13, 2001.

Bridgewater Group, 2002. Phase IB and II Soil and Groundwater Sampling Results, Portland Shipyard Remedial Investigation. June 25, 2002.

Bridgewater Group, 2008. 2007 Annual Groundwater Monitoring Results, Swan Island Upland Facility, Remedial Investigation. March 2008.

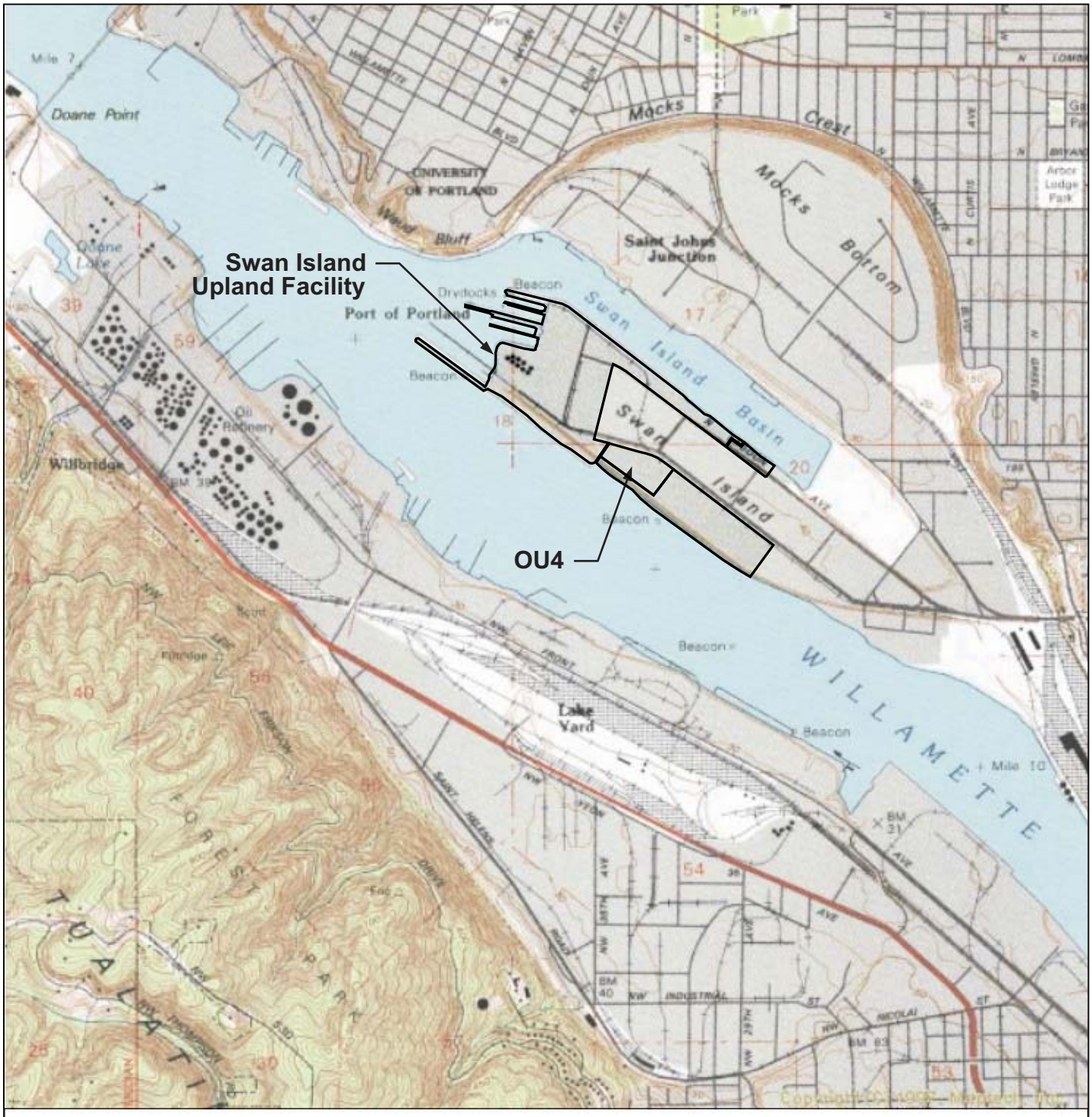
Table 1
Description of Soil Management Areas
Terminal 4 Slip 1 Upland Facility
Portland, Oregon

Soil Management Area	Description	Lateral Extent	Vertical Extent
Area 1	Polycyclic aromatic hydrocarbons (PAHs) in soil	Area approximately 110,000 square feet. See Figure 3.	0.8 to 20 feet below surface of cap
Area 2	Arsenic in surface soil	Up to 5,000 square feet. See Figure 3.	0.8 to 3 feet below surface of cap

Table 2
Soil Characterization Concentration Limits
Terminal 4 Slip 1 Upland Facility
Portland, Oregon

Compound	Soil Concentration Limits	
	Unrestricted Use [1] (mg/kg)	Occupational Screening Levels [2] (mg/kg)
Total Petroleum Hydrocarbons		
Diesel/Heavy Oil Combined	100	23,000
Polynuclear Aromatic Hydrocarbons (PAHs)		
Acenaphthene	0.3	61,000
Anthracene	0.845	>100,000
Benzo(a)anthracene	0.15	2.7
Benzo(a)pyrene	0.015	0.27
Benzo(b)fluoranthene	0.15	2.7
Benzo(k)fluoranthene	1.5	27
Chrysene	1.29	270
Dibenzo(a,h)anthracene	0.015	0.27
Fluoranthene	2.23	29,000
Fluorene	0.536	41,000
Indeno(1,2,3-cd)pyrene	0.1	2.7
Naphthalene	0.087	23
Pyrene	1.52	21,000
Metals		
Arsenic[3]	7	7

Notes:
1. Unrestricted Use Soil values from Oregon DEQ-NWR Clean Fill Screening Table (October 12, 2009).
2. Occupational Screening Levels from Oregon DEQ RBDM table (September 2009 update).
3. Arsenic concentration equal to default background from Oregon DEQ-NWR Clean Fill Screening Table (October 12, 2009).
4. mg/kg = milligrams per kilogram.



NOTE: Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000

Approximate Scale in Feet

N

Facility Location Map

Soil Management Plan
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
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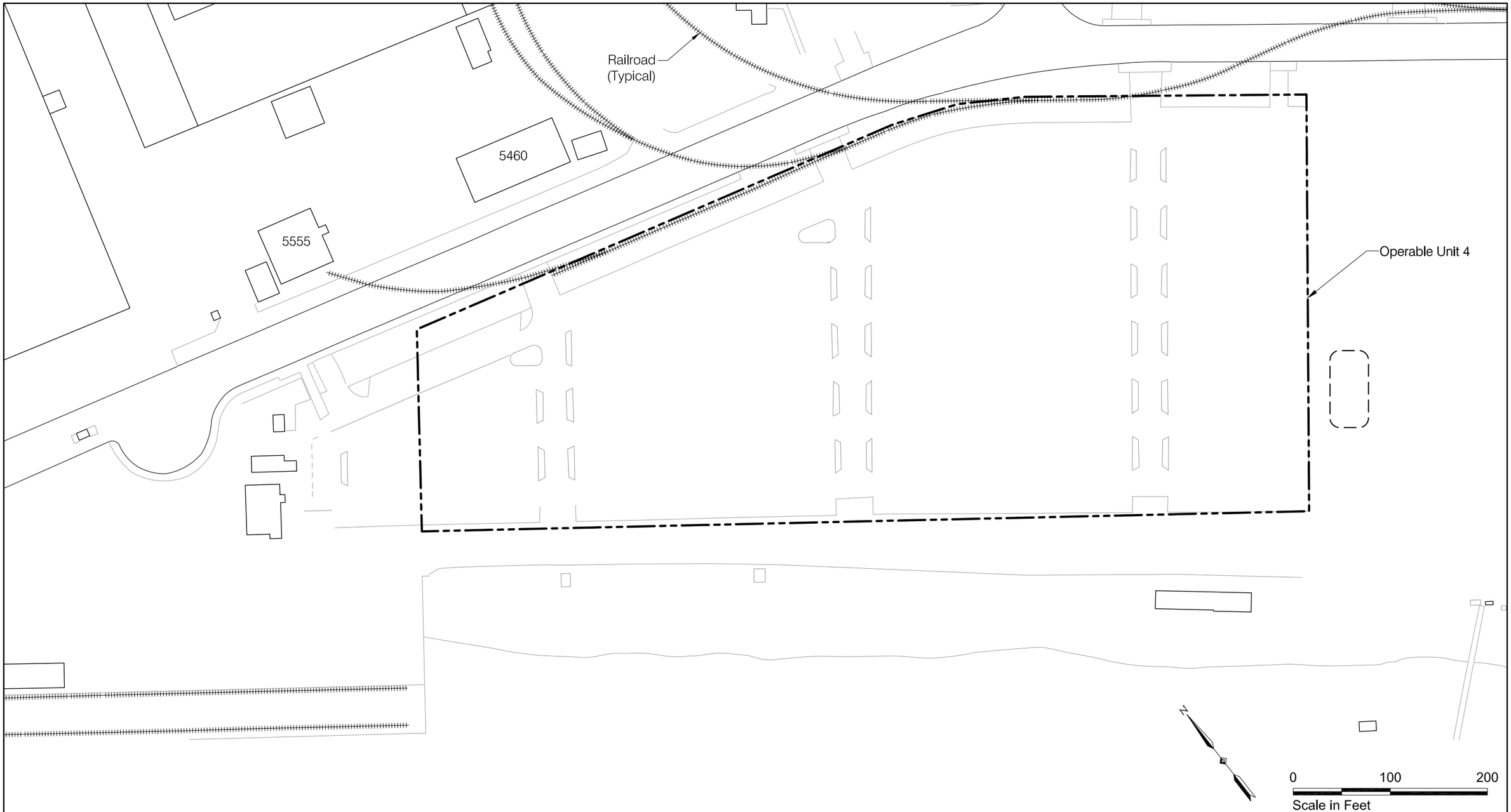


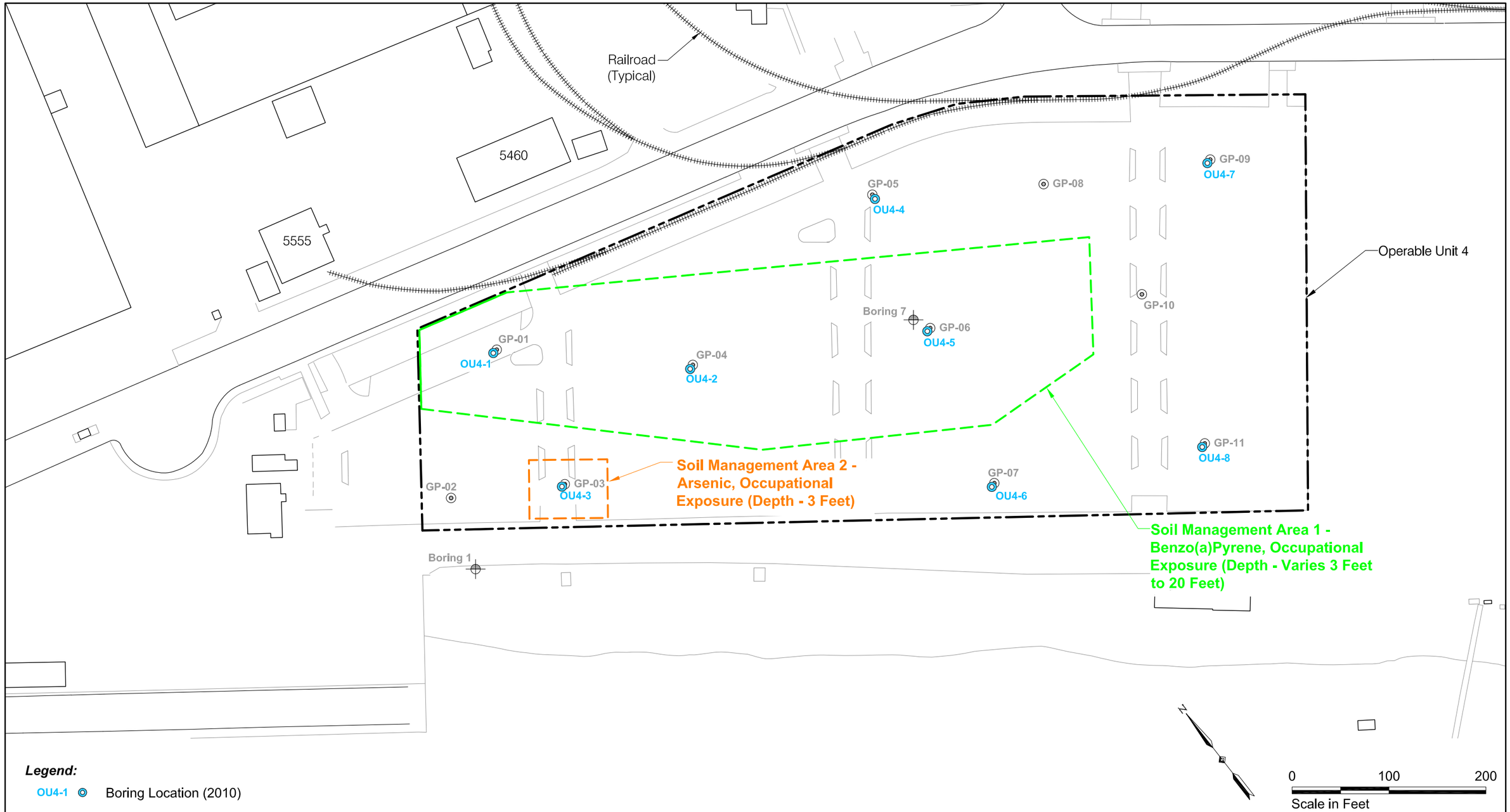
NOTES:
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.
2. Aerial photograph from from 2010 - Google Imagery. Aerial dated 2008.

Facility Plan

Soil Management Plan
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
November 2011		2



Legend:

- OU4-1 — Boring Location (2010)
- Boring 1 — Soil Boring Location (1998)
- GP-07 — URS Boring Location (2009)

NOTE:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

Soil Management Areas

Soil Management Plan
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

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November 2011		3

Appendix A

Historical Soil Data Tables and Figure

Railroad
(Typical)

5460

5555

Operable Unit 4

GP-09
OU4-7

GP-08

GP-05
OU4-4

GP-10

Boring 7

GP-06
OU4-5

GP-01
OU4-1

GP-04
OU4-2

GP-11
OU4-8

GP-07
OU4-6

GP-03
OU4-3

GP-02

Boring 1

N

0 100 200
Scale in Feet

Legend:

OU4-1 Boring Location (2010)

Boring 1 Soil Boring Location (1998)

GP-07 URS Boring Location (2009)

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

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Upland Sample Location Plan

Soil Management Plan
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1115-11

November 2011

Figure A-1

TABLE A-1
Analytical Data Results—Main Parking Lot (Detected Constituents Only)

Boring No.	Sample Interval	Detected Analyte	Detection Limit (mg/kg)*	Reporting Limit (mg/kg)*	Sample Results (mg/kg)*
1	0 to 24 inches	Arsenic	0.250	0.500	2.71
		Barium	0.0545	5.00	81.3
		Chromium	0.0470	0.500	12.5
		Lead	0.320	5.00	11.6
	16 to 18 feet	Arsenic	0.250	0.500	1.60
		Barium	0.0545	5.00	84.1
		Chromium	0.0470	0.500	10.5
7	0 to 24 inches	Arsenic	0.250	0.500	2.45
		Barium	0.0545	5.00	158
		Chromium	0.0470	0.500	13.6
		Lead	0.320	5.00	7.00
		Heavy oil range hydrocarbons	13.0†	100†	451†
	16 to 18 feet	Arsenic	0.250	0.500	1.67
		Barium	0.545	5.00	76.7
		Chromium	0.0940	1.00	9.44

*All weights are mg/kg dry unless noted otherwise.
†mg/kg, not reported as "dry"

Table A-2
Soil Analytical Results: TPH
Swan Island Upland Facility
Portland, Oregon

Sample Number	Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
Sampling Interval (inches)	30 - 40	34 - 46	28 - 40	22 - 34	13 - 23	14 - 28	10 - 24	14 - 25
Sample Date	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
TPH-HCID	Concentrations in mg/kg (ppm)							
Gasoline-Range	<22	<22	<22	<24	<27	<24	<24	<27
Diesel-Range	<54	<54	<55	<59	<68	<59	<60	<66
Residual-Range	<110	<110	<110	<120	<140	<120	<120	<140

Notes:

1. TPH-HCID = Hydrocarbons identification by Northwest Method NWTPH-HCID.
2. mg/kg = milligram per kilogram (parts per million [ppm]).
3. < = Not detected above the method reporting limit.
4. Shading = Detected concentration.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.
   For example, Sub A-N-1 = Substation A, North corner, sample 1.

Table A-3
Soil Analytical Results: PCBs
Swan Island Upland Facility
Portland, Oregon

Sample ID:	Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
Sampling Interval (inches)	30 - 40	34 - 46	28 - 40	22 - 34	13 - 23	14 - 28	10 - 24	14 - 25
Sample Date:	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
PCBs								
Aroclor 1016	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1221	<20	<20	<20	<20	<20	<20	<20	<20
Aroclor 1232	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1242	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1248	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1254	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1260	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9

Notes:

1. PCBs = Polychlorinated Biphenyls by EPA Method 8082.
2. µg/kg = micrograms per kilogram (parts per billion [ppb]).
3. < = Not detected above the method reporting limit.
4. Shading = Detected concentration.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.
   For example, Sub A-N-1 = Substation A, North corner, sample 1.

Table A-4. URS Soil Analytical Results

Shipyard Commerce Center Parking Lot Purchase (units = mg/kg)

					NWTPH-Dx[1]						TBT Compounds			Detected PAHs per EPA 8270-SIM												Detected Priority Pollutant Metals							
	Location	Sample ID	Sample Depth (ft)	Date	Diesel Range	Heavy Oil Range	NWTPH-Gx Gasoline Range	VOCs	SVOCs	PCBs	Tributyltin	Dibutyltin	Butyltin	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Arsenic	Barium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
URS Soil Results	GP-01	GP01-05-080523	4-8	23-May-08	21.8U	43.7U	3.78U	< MRLs	< MRLs except PAHs[4]	< MRLs	0.0036U	**0.023**	**0.0075**	0.0521U	**0.135**	**0.237**	**0.332**[2]		**0.303**	**0.202**	**0.385**	**0.243**	0.0521U	**0.0779**	**0.536**	**2.19**	-	**9.52**	**10.6**	**2.27**	0.0857U	**11.6**	**30**
		GP01-20-080523	18-22	23-May-08	42.4U	84.9U	6.09U				0.0037U	0.0055U	0.0039U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	**3.61**	-	**19**	**20.3**	**3.81**	**0.563**	**22.3**	**55.6**
		GP01-40-080523	36-40	23-May-08	29.2U	58.5U	4.82U				0.0037U	0.0055U	0.0039U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	**2.65**	-	**12.7**	**14**	**2.23**	0.113U	**15.4**	**37.7**
	GP-02	GP02-5-080517	4-6	17-May-08	23.4U	46.9U	3.98U				0.0038U	0.0057U	0.0040U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	**1.71**	-	**12.7**	**11.5**	**1.94**	0.0963U	**15**	**38.5**
		GP02-50-080517	50-52	17-May-08	38U	75.9U	5.08U				0.0037U	0.0055U	0.0039U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	**1.76**	-	**18.9**	**16.8**	**2.82**	0.121U	**21**	**50.1**
		GP02-75-080517	73-75	17-May-08	28.3U	56.7U	4.83U				0.0038U	0.0057U	0.0040U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	**3.17**	-	**11.9**	**13.4**	**2.23**	0.114U	**17.8**	**40.6**
		GP02-110-080517	108-110	17-May-08	35.1U	70.2U	4.86U				0.0038U	**0.032**	**0.010**	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	**2.08**	-	**12.7**	**14.4**	**2.12**	0.112U	**18.8**	**41**
	GP-03	GP03-05-080523	4-8	23-May-08	35.8U	71.6U	4.94U				0.0036U	0.0054U	0.0038U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	**1.79**	-	**10.1**	**11.3**	**1.97**	0.11U	**13.1**	**36.8**
		GP03-20-080523	18-22	23-May-08	38.9U	77.8U	5.29U				0.0037U	**0.024**	**0.0062**	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	**2.82**	-	**19.5**	**18.1**	**3.35**	0.109U	**20.8**	**49.1**
		GP03-40-080523	36-40	23-May-08	35.2U	70.3U	4.93U				0.0038U	0.0057U	0.0040U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	**3.24**	-	**11.8**	**13.8**	**1.99**	0.122U	**15.2**	**37.5**
	GP-04	GP04-05-080522	4-8	22-May-08	32.8U	65.6U	4.63U				0.0038U	0.0058U	0.0041U	0.0724U	**0.144**	**0.283**	**0.37**[2]		**0.255**	**0.231**	**0.471**	**0.227**	0.0724U	**0.246**	**0.684**	**3.94**	-	**14**	**14.3**	**2.48**	0.096U	**16.8**	**41.4**
		GP04-20-080522	18-22	22-May-08	30U	59.9U	4.61U				0.0038U	**0.0072**	0.0040U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	**2.79**	-	**17.7**	**15.2**	**3.26**	0.106U	**18.9**	**43.8**
		GP04-40-080522	36-40	22-May-08	37.4U	74.8U	4.86U				0.0038U	**0.0086**	0.0040U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	**1.82**	-	**17.9**	**15.4**	**2.7**	0.115U	**15.7**	**41.9**
	GP-05	GP05-05-080522	4-8	22-May-08	34U	67.9U	4.93U				0.0038U	0.0057U	0.0040U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	**2.04**	-	**12.7**	**13.3**	**2.2**	0.111U	**16**	**39**
		GP05-20-080522	18-22	22-May-08	48.9U	97.8U	6.32U				0.0037U	**0.038**	**0.0082**	**0.0448**	**0.0873**	**0.0803**	**0.0956**[2]		0.0434U	**0.0984**	**0.187**	0.0434U	0.0434U	**0.139**	**0.235**	**2.89**	-	**15.1**	**16.6**	**3.03**	0.141U	**20.9**	**49**
		GP05-40-080522	36-40	22-May-08	32.8U	65.6U	4.19U				0.0037U	**0.0088**	0.0039U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	**1.59**	-	**10.1**	**12.1**	**1.72**	0.0883U	**12.6**	**32.4**
	GP-06	GP06-7.5-080516	5-10	16-May-08	**190**	**536**	4.72U				0.0037U	**0.028**	**0.0080**	0.938U	**2.94**	**5.88**	**7.38**[2]		**5.61**	**5.04**	**9.1**	**4.73**	0.938U	**3.56**	**13**	**2.09**	-	**12.7**	**13.4**	**2.82**	0.0955U	**16**	**41.4**
		GP06-50-080516	47-53	16-May-08	29.8U	59.6U	4.97U				0.0038U	0.0057U	0.0040U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	1.29U	-	**14.7**	**14.4**	**2.4**	0.103U	**18.4**	**46**
		GP06-75-080516	70-75	16-May-08	34.9U	69.8U	4.73U				0.0038U	0.0057U	0.0040U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	**1.58**	-	**13.5**	**12.7**	**2.06**	0.107U	**18.9**	**39.4**
		GP06-110-080516	105-110	16-May-08	33.3U	66.6U	5.00U				0.0038U	0.0057U	0.0040U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	**2.15**	-	**12.2**	**14.4**	**2.16**	0.0988U	**17.5**	**41.7**
	GP-07	GP07-05-080522	4-8	22-May-08	34U	68U	4.60U				0.0036U	**0.0073**	**0.0045**	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	**3.04**	-	**18**	**17.5**	**3.13**	0.107U	**20.3**	**47.5**
		GP07-20-080522	18-22	22-May-08	33.9U	**115**	4.67U				0.0037U	0.0055U	0.0039U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	**3.04**	-	**19.4**	**20.2**	**5.19**	**0.116**	**21.3**	**54.6**
		GP07-40-080522	36-40	22-May-08	35.9U	71.7U	4.80U				0.0037U	0.0055U	0.0039U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	**4.34**	-	**12.2**	**13.6**	**2.81**	0.109U	**14.7**	**34.3**
	GP-08	GP08-05-080522	4-8	22-May-08	28.6U	57.1U	4.77U				0.0038U	**0.019**	0.0040U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	**2.79**	-	**21.4**	**16.7**	**3.47**	0.117U	**21.2**	**48.5**
		GP08-20-080522	18-22	22-May-08	32.2U	64.5U	4.72U				0.0038U	**0.0094**	0.0040U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	**2.07**	-	**12.4**	**13.4**	**2.25**	0.105U	**14.9**	**39.3**
		GP08-40-080522	36-40	22-May-08	29.5U	59U	4.78U				0.0037U	0.0055U	0.0039U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	**1.74**	-	**12.5**	**14.9**	**2.07**	0.116U	**15.1**	**39.2**
	GP-09	GP09-5-080518	5-8	18-May-08	24.3U	**411**	4.23U				0.0039U	0.0058U	0.0041U	0.207U	-	1.03U	0.207U	0.207U	1.03U	0.207U	0.207U	1.03U	0.207U	0.207U	0.207U	**2.38**	-	**14.1**	**12.8**	**2.56**	**0.117**	**15.1**	**43.5**
		GP09-50-080518	48-50	18-May-08	30.2U	60.4U	5.02U				0.0037U	0.0055U	0.0039U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	1.43U	-	**11.2**	**13.6**	**1.92**	0.115U	**15**	**39.3**
		GP09-75-080518	73-75	18-May-08	31.3U	62.6U	4.77U				0.0038U	**0.018**	**0.0047**	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	**1.41**	-	**10.4**	**12.3**	**1.89**	0.103U	**14**	**36.1**
		GP09-110-080518	108-110	18-May-08	27.6U	55.3U	4.99U				0.0038U	0.0057U	0.0040U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	**2.23**	-	**15.3**	**15.4**	**2.37**	0.104U	**24.5**	**46**
	GP-10	GP10-5-080518	3-5	18-May-08	38.2U	76.4U	5.60U				0.0036U	0.0054U	0.0038U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0509	0.0508U	0.0508U	0.0508U	**0.0624**	**2.97**	-	**30.6**	**25.5**	**5.63**	0.119U	**25.4**	**61.6**
		GP10-18-080518	17-19	18-May-08	36.4U	72.8U	5.30U				0.0036U	0.0054U	0.0038U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	**5.75**	-	**23.1**	**24**	**4.54**	**0.195**	**24.2**	**59.8**
		GP10-40-080518	38-40	18-May-08	30.7U	61.4U	5.41U				0.0036U	0.0054U	0.0038U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	**2.56**	-	**22.2**	**20.2**	**3.02**	0.0989U	**24.5**	**56.9**
	GP-11	GP11-5-080518	3-5	18-May-08	31U	62.1U	4.89U				0.0038U	0.0056U	0.0040U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	**3.47**	-	**31.6**	**26.8**	**5.01**	**0.409**	**26.3**	**61.6**
		GP11-20-080518	18-20	18-May-08	36.6U	73.3U	5.57U				0.0037U	0.0055U	0.0039U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	**0.0687**	0.0461U	**0.0498**	**0.0566**	**0.0777**	**4.37**	-	**35.1**	**51.7**	**28.1**	**1.83**	**27.1**	**88**
		GP11-40-080518	38-40	18-May-08	27.1U	54.2U	4.79U				0.0036U	0.0054U	0.0038U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	**2.07**	-	**23.5**	**20.5**	**2.96**	0.0959U	**21**	**50.8**
DEQ Default Background Concentrations for Metals[3]					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	42	36	17	0.07	38	86
JSCS Table 3-1: Upland Soil / Stormwater Sediment[5]					-	-	-	-	-	0.00039	0.0023	-	-	0.845	1.05	1.45	-	13	0.3	1.29	2.23	0.1	0.561	1.17	1.52	7	-	111	149	17	0.07	48.6	459

Notes:

mg/kg: milligrams per kilogram

VOCs : volatile organic compounds per EPA 8260B

SVOCs : semi volatile organic compounds per EPA 8270C

PCBs: polychlorinated biphenyls by EPA 8082

TBT: Tributyl Tins by EPA 8270D-Selected Ion Monitoring (SIM)

PAHs: polyaromatic hydrocarbons per EPA 8270-Selected Ion Monitoring (SIM)

Total Metals per EPA 6020

MRL: method reporting limit

U: less than the MRL

- : Data not analyzed or not applicable

Bold font = indicates detected concentrations above the MRL

Shaded values indicates an exceedance of the screening level value (SLV).

1: TPH-Dx = Diesel and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx.

2: Peak separation for Benzo(b) and Benzo(k)fluoranthenes does not meet method specified criteria. Reported result includes the combined area of the two isomers and should be considered the total of Benzo(b+k)Fluoranthene

3 Washington State Department of Ecology, 1994. Natural Background Soil Metals Concentrations in Washington State, Publication #94-115, October 1994. Statewide average.

4: SVOCs were below the MRLs except for some PAH compounds detected in samples: GP06-7.5-080516 & GP07-40-080522. Only PAH detections from the 8270-SIM analysis are reported above.

5: DEQ, 2007. Portland Harbor Joint Source Control Strategy (JSCS) Document. Table 3-1 (7/16/07 Revison). Most conservative screening level values (SLVs) for Upland Soil/Stormwater Sediment divided into human health and ecological SLVs. Additional bioaccumulative sediment ecological SLVs were used from DEQ, 2007. Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment. January 31.

Table A-5
Soil Analytical Results: TPH
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-2-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	18 - 22	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
NWTPH-HCID (mg/kg)									
Gasoline Range	--	--	ND	--	--	--	--	--	--
Diesel Range	--	--	DETECTED	--	--	--	--	--	--
Motor Oil Range	--	--	DETECTED	--	--	--	--	--	--
NWTPH-Dx (mg/kg)									
Diesel Range SG	<24.5	80.8	--	<28.1	<23.6	98.9	<25.5	<24.3	<23.7
Motor Oil Range SG	<98.2	166	--	<112	<94.5	216	<102	<97.2	<94.7

Notes:

1. NWTPH-Dx = Diesel and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx (with silica gel cleanup).
2. NWTPH-HCID = TPH hydrocarbon identification by Northwest Method NWTPH-HCID.
3. mg/kg (ppm) = milligrams per kilogram (parts per million).
4. < = Not detected above the method reporting limit (MRL).
5. ND = Not detected.
6. -- = Not analyzed.

Table A-6
Soil Analytical Results: Metals
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
Metals (mg/kg)								
Antimony	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Arsenic	4	2.5	18.7	3.1	2.2	3.2	3.1	3.2
Cadmium	<0.10	<0.081	<0.099	<0.089	<0.080	<0.087	<0.079	<0.085
Chromium	31.1	20.0	22.7	21.3	16.6	26.7	20.8	21.0
Copper	76.3	25.4	30.1	25.1	21.4	31.6	28.3	27.8
Lead	48.6	5.3	11.1	4.7	4.6	7.3	4.9	5.0
Nickel	43.3	25.9	28.4	26.6	23.9	28.6	26.1	23.1
Silver	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Zinc	101	52.4	84.4	63.4	60.7	69.3	61.2	62.9
Mercury	<0.11	0.098J	0.040J	0.094J	0.017J	0.041J	0.031J	<0.11

Notes:

1. Metals by EPA 6000/7000 Series Methods.
2. mg/kg (ppm) = milligrams per kilogram (parts per million).
3. < = Not detected above the method reporting limit (MRL).
4. J = Estimated concentration above the method detection limit and below the MRL.

Table A-7
Soil Analytical Results: PAHs
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
PAHs (ug/kg)								
1-Methylnaphthalene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
2-Methylnaphthalene	<44.8	45.0	<9.7	<8.6	52.1	<9.0	<8.8	<8.5
Acenaphthene	<44.8	68.1	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Acenaphthylene	439	868	<9.7	<8.6	1,150	<9.0	<8.8	<8.5
Anthracene	173	695	<9.7	<8.6	716	<9.0	<8.8	<8.5
Benzo(a)anthracene	1,560	4,030	25.9	14.3	6,500	16	<8.8	<8.5
Benzo(a)pyrene	2,850	7,220	26.8	15.3	10,100	24.6	9.7	<8.5
Benzo(b)fluoranthene	2,540	5,420	15.7	10.4	8,340	14.6	<8.8	<8.5
Benzo(g,h,i)perylene	3,430	7,050	14.6	11.4	11,300	16.6	8.9	<8.5
Benzo(k)fluoranthene	1,550	4,180	17.1	10.4	6,860	14.1	<8.8	<8.5
Chrysene	2,110	5,950	23.0	13.7	8,770	18.9	<8.8	<8.5
Dibenz(a,h)anthracene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Fluoranthene	4,370	16,200	36.0	26.9	21,700	22.6	12.3	11.2
Fluorene	49	277	<9.7	<8.6	191	<9.0	<8.8	<8.5
Indeno(1,2,3-cd)pyrene	2,310	5,080	11.8	<8.6	8,130	13.3	<8.8	<8.5
Naphthalene	51.2	131	14.6	<8.6	133	9.9	<8.8	<8.5
Phenanthrene	1,490	9,480	15.7	10	9,620	11.1	<8.8	<8.5
Pyrene	7,050	19,800	46.0	30.7	26,600	29.5	22.7	13.7

Notes:

1. PAHs = Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270M-SIM.
2. µg/kg (ppb) = Micrograms per kilogram (parts per billion).
3. < = Not detected above the method reporting limit (MRL).

Appendix B

Cap Inspection Form

Cap Inspection Form
Soil Management Plan
Swan Island Upland Facility - OU4
Portland, Oregon

Date	Inspector	Condition of Pavement Cap	Actions Needed	Action Completed		Notes
				Date	Initials	
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				
		1 2 3 4 5				

Condition: **1** = Failed; Needs Immediate Attention **2** = Likely to Fail; Needs Attention **3** = Poor Condition; Should Receive Attention
4 = Reasonably Good Condition; Attention Not Necessary **5** = Good Condition; No Attention Needed